Robotic technology and palliative care education: the development of a 'Nao robot' computer program

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Background

Robots are increasingly being used to support management in certain areas of healthcare education. However, the potential application of robotics in palliative care education or simulation has not been explored.

Aim

This collaborative project between Computer Science and Palliative Care aimed to program a robot to convey emotion in response to human interaction, in order to develop a robotics program for potential use in palliative care education.

Methods

The Nao robot is an autonomous, programmable humanoid robot that is controlled by a Linux-based operating system. The robot has capabilities for voice recognition and sound localisation (in-built microphones), multilingual text-to-speech synthesis (in-built speakers) and vision, which include facial and shape recognition (in-built high definition cameras). The robot was programmed by a computer scientist to convey ten emotions (relaxed, anger, withdrawn/sad, lightly crying, heavy sobbing, happy/excited, scared, tired, laughing and dancing) through its posture, movement and speech, in response to human-voiced questions and interaction.

Results

The robot was successfully programmed to convey the ten target emotions in response to direct questions posed by a human subject. Discussions around the robot's displayed emotions were explored (e.g. "why are you sad?") to assess the potential of human-computer interaction. The robot continues to acquire a growing lexicon of vocabulary, in addition to an increasing number actions and responses. The robot acts both autonomously and through direct instruction of the operator.

Conclusions

We have successfully programmed a robot to interact with humans and display emotional responses. This technology could potentially be used to develop innovative ways to engage individuals in discussion about palliative care issues and create opportunities to use robots for interactive educational activity. Consequently, further research can explore the potential to use robotic technology in palliative care for education, and to promote discussion with the public (e.g. children) and healthcare professionals.